

and there is apparently an absorption of energy which does not appear either in the form of expansion or of sensible heat as temperature. At this high stage the specific heat of some of the simple gases has increased threefold, while some gases have a greater rate of expansion than others.

The same thing occurs with other simple gases, but at a much lower temperature, as, even within  $0^{\circ}$  and  $200^{\circ}$ , where dissociation cannot be entertained, chlorine and other halogens differ considerably from N or H, and at  $1600^{\circ}$ , if an air thermometer indicated  $1600^{\circ}$  for a given expansion, a chlorine one would register by expansion  $2400^{\circ}$  for an equal temperature, though with a much greater absorption of heat by the chlorine.

This difference is dependent on the fact that at  $1600^{\circ}$  the comparative density of chlorine has diminished one-third; or, in other words, that its volume, as compared with H, instead of being 1, has become  $1\frac{1}{5}$ ; or, to put it in another way, that under these conditions, the specific heat of Cl is threefold that of H.

Quite apart from these extreme cases the specific heat is never a constant value; it takes more heat to raise a given weight of substance  $1^{\circ}$  at one temperature than another.

The specific heat increases with temperature, but differently for different substances:

	$0^{\circ}$ to $100^{\circ}$	$0^{\circ}$ to $300^{\circ}$
Iron ... ... ... ...	= 1.098	1.218
Platinum ... ... ... ...	= 0.335	0.343
Mercury ... ... ... ...	= 0.330	0.350

The differences here are both distinct and small, but Be (glucinum) increases twofold within a moderate range, and we have seen that between  $-50^{\circ}$  and  $600^{\circ}$  carbon increases its specific heat sevenfold, or, as Mr. Sprague expresses it: "The heat relation of each substance is described by a particular curve; and the small differences observed in some cases are not errors, but actual differences of the several curves, and where there is approach to identity it is accidental, due to the temperature of observation being within a limit at which the curves are near their commencement, and have barely begun to separate."

However tempting or fashionable it may be to rush into hypothetical explanations of half-digested truths, yet I have taken some pains to keep within facts, which are in some respects incipient and but little understood.

If the causal differences in the production of light and sound had been fairly or patiently entertained, the "luminiferous ether" would never have been invented, which now crosses our path, as an "opaque fact, stopping the progress of further knowledge."

If a little more humility and patience had been evinced in respect of the expanding facts connected with gaseous volumes and specific heats, the old equivalents would never have been doubled, trebled, or quadrupled, to mar the symmetry of a beautiful science.

I quite agree with M. Troost, who, in repudiating the hasty references to dissociation, &c., observes: "The only consequences which necessarily flow from the experiments at high temperatures, or at low pressures, are that the coefficient of expansion is variable with the temperature, or that the coefficient of compressibility varies with the pressure." Also with the final conclusion of M. Berthelot: "The only law absolutely and universally applicable to the elements is the invariability of the relations of weight according to which they combine. This notion, and that of the energy brought into play in their reactions, are the sole and only firm foundations of chemical science."

SAMUEL E. PHILLIPS

#### A Carnivorous Plant

WITH reference to Prof. Moseley's letter in your issue of May 22 (p. 81) on "A Carnivorous Plant preying on Vertebrata," I may mention that in 1881, when surveying at the Paracel Islands in the South China Sea, I saw a somewhat similar occurrence. The tide was low on the reef on which I was strolling and admiring the lovely forms of coral existence. As I neared a pool cut off by the tide from the sea, I noticed amongst other submarine verdure a very ordinary-looking flesh-coloured weed about one foot high and of similar girth. My appearance alarmed numbers of tiny fish, which darted to the cover of overhanging ledges, but I noticed about half a dozen apparently seeking cover in the weed. Bending down closer, I saw that they were lying helpless about the fronds, with very little life left in them. Putting my hand down to pick up one of the half-dead fish, I found my fingers sucked by the weed, the fronds of which

closed slightly on them. The fish were not caught by the head especially, but held anywhere round the body. The death seemed to be slow and lingering, and where the fish had been held its skin was macerated. These captives may have been caught some time, and were in different stages of exhaustion. I regret being unable to name the plant, or the young fish. They were from an inch to an inch and a half long. The plant had a dirty and rather slimy look about it.

ALFRED CARPENTER  
H.M.S. *Myrmidon*, Suakim, Red Sea, June 24

#### Phosphorescence of the Jelly-Fish

THE conclusions arrived at by Mr. Verrill (NATURE, July 17, p. 281) cannot fail to be of interest to all who have ever speculated on the significance of the luminosity displayed by so many *Acalephae*, *Medusae*, and other marine organisms. When in the tropics, in 1875, very similar ideas occurred to me, and in an address on the phenomena of cyclical propagation delivered to the Essex Field Club on January 28, 1882, I ventured to put forward the following views, which, as the address is still in manuscript, I will beg permission to quote:—"It was in the Bay of Bengal, when on the Eclipse Expedition of 1875, that I first saw shoals of *Medusa* in their full splendour. Speculating on the meaning of the vivid colours and brilliant phosphorescence of these creatures, I came to the conclusion that both these characters might be protective danger-signals of the same nature and fulfilling the same function as the bright colours of distasteful caterpillars according to Wallace's well-known theory, or the phosphorescence of the *Lampyridae* according to Thomas Belt ('Naturalist in Nicaragua,' p. 320). The 'urticating' powers of the jelly-fish would certainly make them unpleasant, if not absolutely dangerous, to predatory fish, and their bright colours and luminosity at night may thus be true warning characters."

R. MELDOLA

London, July 21

#### Fireball

RECORDED personal observations, such as that of Miss Annie E. Cocking (NATURE, p. 269) last week, must needs be so rare that every detail of them—especially where the description is clear and simple—is of weight and value. What strikes my own mind as of much interest in this one is that, as the strange and fatal visitant sank towards the carpet, "at this instant a peal of thunder crashed over the house—it was the very loudest the writer had ever heard." This would seem to show that, whatever the nature of the insulator which envelopes these floating Leyden jars, their connection is maintained unbroken with the cloud of origin until the moment of discharge; and that, whatever causes the "crash," a peal of thunder takes effect rather in the cloud than at the point of contact. This agrees also with the descent of a fireball in the sea at Margate, mentioned in to-day's papers, where the crash of thunder occurred while the ball was yet in sight. But it is still another question whether these floating globes, which only discharge themselves on contact, do not in some important respect differ in their nature from the commoner "fireball" discharged with the directness, if not all the speed, of a lightning flash out of a thundercloud. It is a question towards the solution of which only observations such as that for which we are indebted to Miss Cocking can materially help us.

HENRY CECIL  
Bregner, Bournemouth, July 21

#### Animal Intelligence

THE following instance of animal intelligence may interest some of your readers. While walking through the forest here the other day, I found a young jay upon the ground scarcely able to fly. As I stooped down to examine it I was somewhat startled by a swoop made at my head by the old birds, their wings actually touching my hat. Determined not to be driven away, I remained by the young bird, whereupon a succession of like swoops were made at my head; these I easily succeeded in parrying with my stick, although the old birds frequently came in different directions. After about a couple of minutes the old birds seem to have come to the conclusion that nothing could be achieved in this fashion, and one of them, flying to some little distance, kept calling to the younger one, who half hopped, half flew after her. I of course followed; and now occurred what seems to me a striking instance of animal sagacity. The pines here are covered with lichen and a long, hairy kind of moss,

which easily crumbles into dust. The cock bird perched himself on the tree over my head, and began pecking with wonderful rapidity at this lichen and moss, so that, the moment I looked up, a shower of fine dust fell on my face. As I followed the young bird, the old one followed me, got on a branch as close to my head as he could, and sent a shower of dust down upon me. I can scarcely doubt that the dust, like the previous swoops, was intended rather to blind me than to distract my attention. Have instances of like sagacity—*i.e.* the apparent knowledge of the organ of vision and the means of injuring it—been noticed in *jays* before?

KARL PEARSON

Saig, Schwarzwald, July 14

#### Munro and Jamieson's Electrical Pocket-Book

As Mr. A. Gray's criticism of our "Pocket-Book" is chiefly confined to literal errors practically unavoidable in a work of the kind, we take the opportunity of stating that we have lately been correcting these for the second edition, which, we are happy to say, has already been called for.

J. MUNRO AND A. JAMIESON

I OBSERVE that in my article in the last number of NATURE the third sentence of the third paragraph of p. 263, beginning "In the particular case, &c.," should have the words "corrected for the heat of combination of copper oxide and sulphuric acid" inserted after the word "this."

A. GRAY

Glasgow, July 21

#### THE GREELY EXPEDITION

SUCCESS has at last attended the efforts to rescue the expedition to Lady Franklin Bay under Lieut. Greely; but, alas, out of the twenty-five men who started three years ago nineteen have perished. The party had left their station, Fort Conger, in August last, but did not succeed in getting further south than Cape Sabine, in Ellesmere Land, at the entrance to Smith Sound, about 150 miles from Lady Franklin Bay, and some 300 or 400 miles from Upernivik, the nearest Danish station. It is easy now to say that it would have been much better for the expedition to have stayed on in their comparatively comfortable quarters at Discovery Bay; the chances are that they would all have survived, and probably all have been rescued this summer by the relief party in the *Bear* and the *Thetis*.

We may remind our readers that the Greely expedition was sent out by the Government of the United States as one of the series of International Arctic expeditions, the main purpose of which was to take regular observations, according to a preconcerted plan, on the meteorological and other physical conditions of the Polar area. As the Greely expedition had to go much further north than any of the others, it started a year earlier in order to be sure to reach its post in time and be able to begin observations not later than August 1882. It was thoroughly equipped, both with scientific apparatus and with the material for a comfortable life under unusually trying conditions. The provisions supplied could have easily been made to last until the present summer, and we know from letters from Lieut. Greely, written shortly after his arrival, that the region around Lady Franklin Bay, 81° 44' N. lat., abounded in musk oxen. In the summer of 1882 strenuous efforts were made to reach the station, but with no success. Last year two vessels were sent out, but the state of the ice was such that one was completely crushed and the other was glad to escape southwards almost as soon as it had entered the threshold of the intricate channel that led to Fort Conger.

The expedition which has been so fortunate as to rescue the six survivors consisted of the United States ships *Bear* and *Thetis* and Her Majesty's ship *Alert*, which was presented to the United States Government for the purpose. The condition in which the few survivors were found is almost too harrowing to record; how very nearly too late the rescue party were is impressively shown by the fact

that Lieut. Greely, surrounded by his prostrate companions, was reading the service for the dying. "The red syenite rock forming Cape Sabine," Sir George Nares tells us, "and the islands in the neighbourhood of Payer Harbour is sterile and barren to the last degree. During the three days we were detained there, although parties from the ships explored the whole of the immediate neighbourhood, very little animal life was seen." The end of the cape or peninsula is cut into by a bay in which are several islands—Brevoort, Payer, Stalknecht, &c. Here Sir George Nares in 1875 left 250 rations, which do not seem to have been discovered by the Greely party; and of the 50,000 lbs. of food buried for them by the rescuing parties Lieut. Greely succeeded in finding only 250 lbs.

For full details as to the work accomplished by the unfortunate expedition during its almost three years' stay in so high a latitude we must await the publication of the records. Happily all the records have been saved, and thus the gain to science is likely to be of unusual value. What are the hardships to be met with, and the aspects of nature to be witnessed in this remote latitude, we know something of already from the records of our own expedition ten years ago under Sir George Nares. But the present expedition, profiting by the experience of its predecessors, and working on a carefully prearranged plan, is likely enough to tell us much that we never dreamt of. While the main work of the party was to make regular observations in physical science, it is evident that they have taken advantage of their exceptional position to push back the limits of our ignorance of Arctic geography. The lowest temperature experienced is stated to have been 61° below zero F. We all remember the exciting narrative of the painful scramble of Commander Markham and his brave men over the "palaeocystic ice" in order to make the attempt at least to reach the Pole. After about sixty miles they had to return baffled, glad to escape with their lives. Markham and Parr and their men had, however, the satisfaction of having attained the highest latitude ever reached—83° 20' 26". Lieut. Lockwood, however, succeeded in getting some four or five miles (83° 24') beyond Markham's farthest, and 19° to the east of the English route.

Lieut. Lockwood, unhappily among the dead, seems to have been one of the most active and enterprising members of the expedition. He followed Lady Franklin Bay in its continuation, Archer Fjord, ninety miles beyond Beatrix Bay, Nares's furthest, quite to the other side of Grinnell Land, which he found to be an island, separated by Archer Fjord from the land to the south, now named Arthur Land. This was confirmed by the view obtained from Mount Arthur, 5000 feet high, west of the Conger Mountains, which may possibly be the range named after the United States by Sir George Nares. This Grinnell Land seems in many ways to be an interesting region; there are evidently several peaks or mountain ranges reaching a height of 5000 feet. A considerable area both on the north and south shores is covered by an ice-cap 150 feet thick, while, so far as we can judge from the report, there is a belt of comparatively open country in the interior some sixty miles wide. Even so late as March last, when the members of the expedition were dying one by one on Cape Sabine, exploration was not neglected. From Mount Carey to the north-west of the cape Sergeant Long obtained an extensive observation in the direction of Hayes Sound, which showed him that the Sound extends twenty miles further to the west than is shown on Sir George Nares's chart.

On his journey northwards Lieut. Lockwood succeeded in reaching 7° further east than Lieut. Beaumont's furthest in 1875. From a height of 2000 feet he saw no land to the north or north-west of Greenland, but away to the north-east, in lat. 83° 35', and long. 38° 82',